

U.S. Patent Application No. 10/647,347

Attorney Docket No. 2328-050A

RECEIVED  
CENTRAL FAX CENTER

NOV 09 2006

REMARKS

A typographical error in claim 39 has been corrected. Entry of the amendment is in order because it does not require consideration of new issues or a new search.

There are six separate rejections of claims 32-41 presented in the outstanding office action. The six separate rejections rely on three primary references, Ishii et al., US patent 5,795,429, Chen et al., US patent 6,164 241, and Lee et al., US patent 6,288,493.

The allegations in the office action that the primary references, Ishii et al, Chen et al. and Lee et al., show "the invention substantially as claimed" are wrong. Independent claim 32 is directed to a method of manufacturing many different inductive plasma processors, while independent claims 36 and 39 relate to a method that is performed on several different inductive plasma processors of the same type having different electric field and plasma density distributions from processor to processor. None of the primary references has anything to do with a method of manufacturing such inductive plasma processors or to a method that is performed on several different inductive plasma processors of the same type having different electric field and plasma density distributions from processor to processor. Instead, all three primary references are concerned with the configurations of coils for inductive plasma processors. For this reason alone, the six separate rejections of claims 32-41 are traversed.

Applicants also traverse the rejection of claims 32-41 as being unpatentable as a result Ishii et al., US Patent 5,795,429, Yoshida et al., US Patent 5,690,781, and Savas, US Patent 5,983,828.

BEST AVAILABLE COPY

U.S. Patent Application No. 10/647,347

Attorney Docket No. 2328-050A

The office action includes specific misstatements concerning Ishii et al. The most glaring misstatement is that Figure 9 and the description of Figure 9 in Ishii et al disclose positioning an exterior winding relative to the remainder of a coil so the plasma density incident on a workpiece has a predetermined desired relationship. The description of Figure 9 that is found in column 10, lines 28-46 of Ishii et al says nothing about positioning outer spiral antenna 24A relative to inner spiral antenna 24B, no less positioning the outer spiral antenna relative to the inner spiral antenna so the plasma density incident on a workpiece has a predetermined desired relationship. The description of Figure 8, at column 10, lines 11-16 indicates the plasma density can be made more uniform by arranging outer ring-like antenna 24A and inner ring-like antenna 24B such that the semiconductor wafer is positioned in a region corresponding to the region between the outer and inner antennas. Such a statement does not mean the outer antenna is moved relative to the inner antenna.

Figures 6a and 6b and the description thereof of Yoshida et al, relied on to disclose moving a coil to assist in controlling electric field distribution and plasma density distribution of a plasma processor, also fail to disclose moving one portion of a coil relative to another portion of a coil. The description of Figures 6a and 6b at column 5, lines 7-23 indicates the entire spiral coil is translated radially, causing coil 2 to be located at an optimum location so the coil center of gravity is matched with the axial center of the reaction chamber. None of the three references involved in this ground of rejection disclose positioning an exterior winding relative to the remainder of a coil, as required by independent claim 32, or changing the relative angular position between exterior and interior windings of a coil, as required by independent claim 36, or moving

U.S. Patent Application No. 10/647,347

Attorney Docket No. 2328-050A

exterior and interior windings of a coil relative to each other, as required by independent claim 39, or turning exterior and interior windings relative to each other, as required by dependent claim 33.

Evidence of the unobviousness of moving an outer coil relative to an inner coil can be found by considering Figure 8(a) and the description thereof at column 5, lines 24-37 of Yoshida et al. This portion of Yoshida et al indicates the inner and outer coils of Figure 8(a) do not need to be moved, in contrast to the coil illustrated in Figures 6(a) and 6(b). Yoshida et al. states there is no need to move the combined coils of Figure 8(a) because the combined coils of Figure 8(a) form a structure having an axially symmetrical shape, that is, the structure of Figure 8(a) achieves the same result as is achieved by radially moving the coil illustrated in Figures 6(a) and 6(b). Thus, Yoshida et al did not even apparently consider the possibility of moving the inner and outer coils of Figure 8(a) or any other coils relative to each other. Hence, the overall teaching of the entire Yoshida et al reference would not lead one of ordinary skill in the art to move the outer oil of Ishii et al relative to the inner coil.

Another misstatement in the office action concerning Ishii et al is that Figure 9 includes "plural parallel electrically connected windings (24a, 24b)." In fact, outer spiral winding 24A of Figure 9 is not electrically connected in parallel with inner spiral winding 24B. Instead, windings 24A and 24B are connected to separate high-frequency power supplies 28A and 28B as is obvious from an inspection of Figure 9 and as indicated at column 10, lines 34 and 35. Consequently, none of the three references relied on in this rejection includes the requirement of claims 34, 37 and 40 for parallel windings.

U.S. Patent Application No. 10/647,347

Attorney Docket No. 2328-050A

Applicants cannot agree with the position set forth in the office action that one of ordinary skill in the art would have looked to Savas for a method of manufacturing many different inductive plasma processors so tests conducted on each processor indicate optimum uniform plasma distribution is achieved in each processor, as required by independent claim 32, or for a method that is performed on several different processors of the same type so tests indicate optimum uniform plasma distribution is achieved in each processor, as required by independent claims 36 and 39. Savas has nothing to do with manufacturing many different inductive processors or performing tests on several different processors so tests conducted on each processor indicate optimum uniform plasma distribution is achieved in each processor. Savas is concerned with a plasma processor having a power source that alternates between high and low power cycles to produce and sustain a plasma discharge. There is no mention of manufacturing or performing tests.

The combination of Ishii et al, Yoshida et al and Savas is clearly the result of an examiner reading applicants' claims and casting about to find different references that the examiner believes disclose the various elements of applicants' claims. There is no suggestion in the references that they be combined. Such use of hindsight is clearly improper.

Applicants traverse the rejection of claims 32-41 as being unpatentable as a result of Ishii et al. in view of Ni et al., WO 00/589993, and Savas. The office action relies, in this rejection, on Ishii et al. and Savas in the same manner as in the rejection of claims 32-41 based on Ishii et al., Yoshida et al. and Savas. Consequently, the previous comments regarding Ishii et al. and Savas are applicable to the rejection

U.S. Patent Application No. 10/647,347

Attorney Docket No. 2328-050A

based on Ishii et al., Ni et al. and Savas. For these reasons alone, the rejection of claims 32-41 based on Ishii et al., Ni et al. and Savas is wrong.

The office action relies on Ni et al. to disclose a coil that is moved or that has changes in relative angular position to assist in controlling electric field distribution and plasma density distribution. However, this position does not consider the requirement to move the position of exterior and interior windings relative to each other, as set forth in independent claims 32 and 39, or the requirement of independent claim 36 to change the relative angular position between exterior and interior windings by turning the exterior and interior windings of a coil relative to each other about an axis. In Ni et al., the coil includes a single winding 216 including four constant diameter electrically conducting turns 221-224 that motors 201-203 move up and down by differing amounts relative to window 46; see page 15, line 15-27. Based on the foregoing, Ni et al. fails to meet the foregoing requirements of independent claims 32, 36 and 39. In addition, the examiner has not explained how Ni et al. discloses a coil that has changes in relative angular position, no less a coil that has changes in relative angular position to assist in controlling electric field distribution and plasma density distribution.

The rejection of claims 32-41 as result of Ishii et al., Ni et al. and Savas is also based on hindsight, resulting from the examiner casting about to find claimed features she believes the references disclose and using hindsight to combine them.

Applicants traverse the rejection of claims 32-41 as being obvious as result of Chen et al., US patent 6,164,241, in view of Yoshida et al. and Savas. This rejection relies on Yoshida et al. and Savas in the same manner as the rejection of claims 32-41 based on Ishii et al., Yoshida et al. and Savas. Hence, the previous comments as to



U.S. Patent Application No. 10/647,347

Attorney Docket No. 2328-050A

why one of ordinary skill in the art would not have modified Ishii et al. as result of Yoshida et al. and Savas are applicable to the rejection of claims 32-41 based on Chen et al., in view of Yoshida et al. and Savas.

Applicants traverse the rejection of claims 32-41 as being obvious as result of Chen et al. in view of Ni et al. and Savas. This rejection relies on Ni et al. and Savas in the same manner as the rejection of claims 32-41 based on Ishii et al., Ni et al. and Savas. Hence, the previous comments as to why one of ordinary skill in the art would not have modified Ishii et al. as result of Ni et al. and Savas are applicable to the rejection of claims 32-41 based on Chen et al., in view of Ni et al. and Savas.

Applicants traverse the rejection of claims 32-41 as being obvious as result of Lee et al., US patent 6,288,493, in view of Yoshida et al. and Savas. This rejection relies on Yoshida et al. and Savas in the same manner as the rejection of claims 32-41 based on Ishii et al., Yoshida et al. and Savas. Hence, the previous comments as to why one of ordinary skill in the art would not have modified Ishii et al. as result of Yoshida et al. and Savas are applicable to the rejection of claims 32-41 based on Lee et al., in view of Yoshida et al. and Savas.

Applicants traverse the rejection of claims 32-41 as being obvious as result of Lee et al. in view of Ni et al. and Savas. This rejection relies on Ni et al. and Savas in the same manner as the rejection of claims 32-41 based on Ishii et al., Ni et al. and Savas. Hence, the previous comments as to why one of ordinary skill in the art would not have modified Ishii et al. as result of Ni et al. and Savas are applicable to the rejection of claims 32-41 based on Lee et al., in view of Ni et al. and Savas.

In view of the foregoing remarks, allowance is in order.

U.S. Patent Application No. 10/647,347

Attorney Docket No. 2328-050A

The Examiner is invited to telephone the undersigned, Applicant's attorney of record, to facilitate advancement of the present application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

LOWE HAUPTMAN & BERNER, LLP



Allan M. Lowe  
Registration No. 19,641

USPTO Customer No. 22429  
1700 Diagonal Road, Suite 300  
Alexandria, VA 22314  
(703) 684-1111  
(703) 518-5499 Facsimile  
Date: November 9, 2006  
AML/mps:tal